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EXAMINER	
ZARNEKE, DAVID A	
ART UNIT	**PAPER NUMBER**
2829	

DATE MAILED: 08/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/863,652	CHEAH, ENG-CHEW
	Examiner	Art Unit
	David A. Zarneke	~~2827~~ 2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 20-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 20-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response To Appeal

Upon review of the case with superiors, the examiner has removed the finality of the previous office action and reopened prosecution on the merits of this application.

A new rejection of the claims is detailed below.

Claims 1-13 and 20-27 are pending in this application and claims 14-19 are withdrawn from examination.

Rejections over Gow, 3rd et al, US Patent 5,168,368

Claim Rejections - 35 USC § 102(b)

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Gow, 3rd et al, US Patent 5,168,368 (figure 4).

Regarding claim 2, Gow teaches the intermediate lead finger (26) is mounted on the intermediate lead finger mounting substrate (24) [figure 2].

With respect to claim 3, Gow teaches the intermediate lead finger and the intermediate lead finger mounting substrate are formed of a non-conducting material (4,

49+), wherein the intermediate lead finger mounting substrate is the pier (24) and the intermediate lead finger is the non-conducting adhesive.

As to claim 4, Gow teaches a die attachment pad (13) attached to the intermediate lead finger mounting substrate (figure 2).

In re claim 5, Gow teaches the die attachment pad is made of a heat-conducting material for rapid heat dissipation (1, 15+), wherein copper is a heat dissipating metal.

Regarding claim 6, Gow teaches a mold compound that encloses the semiconductor die, a portion of the package lead, the bond wire, the intermediate lead finger, and the die attachment pad (5, 66+).

Regarding claim 7, Gow teaches the intermediate lead finger comprises a non-conducting portion for attaching to the intermediate portion of the bond wire (4, 49+), wherein the intermediate lead finger is the con-conducting adhesive.

Claims 20-26 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Gow, 3rd et al, US Patent 5,168,368 (figure 4).

Regarding claim 21, Gow teaches the intermediate lead finger (26) is mounted on the intermediate lead finger mounting substrate (24) [figure 2].

With respect to claim 22, Gow teaches the intermediate lead finger and the intermediate lead finger mounting substrate are formed of a non-conducting material (4, 49+), wherein the intermediate lead finger mounting substrate is the pier (24) and the intermediate lead finger is the con-conducting adhesive.

As to claim 23, Gow teaches a die attachment pad (13) attached to the intermediate lead finger mounting substrate (figure 2).

In re claim 24, Gow teaches the die attachment pad is made of a heat-conducting material for rapid heat dissipation (1, 15+), wherein copper is a heat dissipating metal.

Regarding claim 25, Gow teaches a mold compound that encloses the semiconductor die, a portion of the package lead, the bond wire, the intermediate lead finger, and the die attachment pad (5, 66+).

Regarding claim 26, Gow teaches the intermediate lead finger comprises a non-conducting portion for attaching to the intermediate portion of the bond wire (4, 49+), wherein the intermediate lead finger is the con-conducting adhesive.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 8 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gow, 3rd et al, US Patent 5,168,368 (figure 4), as applied to claims 1 and 20 above respectively.

Gow fails to teach the use of a programmable logic device as the semiconductor die.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a programmable logic device as the semiconductor die because programmable logic devices are conventionally known in the art semiconductor die useable in package presently claimed. The use of conventional materials to perform there known functions in a conventional process is obvious (*In re Aller* 220 F.2d 454,456,105 USPQ 233,235 (CCPA 1955)).

Rejections over Gainey et al., US Patent 6,313,519

Claim Rejections - 35 USC § 102(e)

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Gainey et al., US Patent 6,313,519 (figure 4).

Regarding claim 2, Gainey (figure 5) teaches the intermediate lead finger (55) is mounted on the intermediate lead finger mounting substrate (50).

With respect to claim 3, Gainey (figure 6 or 7 or 8) teaches the intermediate lead finger (the adhesive (4, 56+) at the spot where the bond wire is bonded) and the intermediate lead finger mounting substrate (60, 70 or 80) are formed of a non-conducting material (4, 50+ & 4, 61+), wherein the intermediate lead finger mounting substrate is the supports (60, 70 or 80) and the intermediate lead finger is the non-conducting adhesive.

As to claim 4, Gainey teaches a die attachment pad (32) attached to the intermediate lead finger mounting substrate (figure 3 & 4, 12+).

In re claim 5, Gainey teaches the die attachment pad is made of a heat-conducting material for rapid heat dissipation (1, 18+).

Regarding claim 6, Gainey teaches a mold compound that encloses the semiconductor die, a portion of the package lead, the bond wire, the intermediate lead finger, and the die attachment pad (1, 13+).

Regarding claim 7, Gainey teaches the intermediate lead finger comprises a non-conducting portion for attaching to the intermediate portion of the bond wire (4, 49+), wherein the intermediate lead finger is the con-conducting adhesive (4, 56+).

Claims 20-26 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Gainey et al., US Patent 6,313,519 (figure 4).

Regarding claim 21, Gainey (figure 5) teaches the intermediate lead finger (55) is mounted on the intermediate lead finger mounting substrate (50).

With respect to claim 22, Gainey (figure 6 or 7 or 8) teaches the intermediate lead finger (the adhesive (4, 56+) at the spot where the bond wire is bonded) and the intermediate lead finger mounting substrate (60, 70 or 80) are formed of a non-conducting material (4, 50+ & 4, 61+), wherein the intermediate lead finger mounting substrate is the supports (60, 70 or 80) and the intermediate lead finger is the non-conducting adhesive.

As to claim 23, Gainey teaches a die attachment pad (32) attached to the intermediate lead finger mounting substrate (figure 3 & 4, 12+).

In re claim 24, Gainey teaches the die attachment pad is made of a heat-conducting material for rapid heat dissipation (1, 18+).

Regarding claim 25, Gainey teaches a mold compound that encloses the semiconductor die, a portion of the package lead, the bond wire, the intermediate lead finger, and the die attachment pad (1, 13+).

Regarding claim 26, Gainey teaches the intermediate lead finger comprises a non- conducting portion for attaching to the intermediate portion of the bond wire (4, 49+), wherein the intermediate lead finger is the non-conducting adhesive (4, 56+).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 8 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gainey et al., US Patent 6,313,519 (figure 4), as applied to claims 1 and 20 above respectively.

Gainey fails to teach the use of a programmable logic device as the semiconductor die.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a programmable logic device as the semiconductor die because programmable logic devices are conventionally known in the art semiconductor die useable in package presently claimed. The use of conventional materials to perform there known functions in a conventional process is obvious (*In re Aller* 220 F.2d 454,456,105 USPQ 233,235 (CCPA 1955)).

Rejections over Aoki et al., US Patent 4,903,114

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., US Patent 4,903,114, in view of Gainey et al., US Patent 6,313,519, and Lacap, US Patent 5,905,299.

Aoki (figure 7) teaches a semiconductor package, comprising:

an intermediate lead finger mounting substrate (11) having a first surface and a second surface;

a semiconductor die (51) with a bond pad (511), the semiconductor die being attached on the first surface of the intermediate lead finger mounting substrate;

a package lead (5);

a bond wire (18 & 19) comprising a first end portion coupled to the package lead, a second end portion coupled to the bond pad, and an intermediate portion (figure 7);

an intermediate lead finger (raised portion of 11) mounted on the first surface of the intermediate lead finger mounting substrate, wherein the intermediate lead finger is positioned between the package lead and the bond pad, and wherein the intermediate lead finger is attached to the intermediate portion of the bond wire, and remains so attached through a subsequent molding process (2, 25+).

Aoki fails to teach the use of one bond wire.

Gainey teaches a structure having an intermediate lead finger and one continuous bond wire (figure 4).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the one bond wire of Gainey in the invention of Aoki because it would be easier and less expensive to contact one wire as opposed to dealing with two separate wires.

Both Aoki and Gainey fail to teach a heat sink coupled to the second surface of the intermediate lead finger mounting substrate; and a mold compound that encloses

the semiconductor die, a portion of the package lead, the bond wire, the intermediate lead finger, and the heat sink.

Lacap teaches a typical leadframe with heat sink (614) coupled to the second surface of the intermediate lead finger mounting substrate (610); and a mold compound (604) that encloses the semiconductor die (606), a portion of the package lead (602), the bond wire (612), the intermediate lead finger (when combined with Gainey, it inherently would be encapsulated), and the heat sink (614).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the heat sink and encapsulation of Lacap in the combined invention of Aoki and Gainey because heat sinks and encapsulants used in this manner would be more than obvious to a skilled artisan. The use of conventional materials to perform there known functions in a conventional process is obvious (MPEP 2144.07).

Regarding claim 10, Aoki teaches the intermediate lead finger and the intermediate lead finger mounting substrate are formed of a non-conducting material (3, 53+).

With respect to claim 11, Aoki teaches the intermediate lead finger comprises a non- conducting portion for attaching to the intermediate portion of the bond wire (3, 53+).

As to claim 12, while Aoki, Gainey and Lacap fail to teach the use of a programmable logic device as the semiconductor die, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a programmable logic device as the semiconductor die because programmable logic devices are

conventionally known in the art semiconductor die useable in package presently claimed. The use of conventional materials to perform there known functions in a conventional process is obvious (*In re Aller* 220 F.2d 454,456,105 USPQ 233,235 (CCPA 1955)).

In re claim 13, Aoki teaches the semiconductor die is mounted on a center portion of the first surface of the intermediate lead finger mounting substrate, and wherein the intermediate lead finger is mounted on a peripheral portion of the first surface of the intermediate lead finger mounting substrate (figure 7).

Claims 2-7 and 21-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Gow, 3rd et al., US Patent 5,168,368, as applied to claims 1 and 20 above respectively, and further in view of Aoki et al., US Patent 4,903,114.

As an alternative to the above *35 USC § 102* rejection of these claims, this rejection is cited to reject what was intended to be claimed, as in figure 1A.

Regarding claims 2 and 21, Gow fails to teach an intermediate lead finger mounting substrate, wherein the intermediate lead finger is mounted on the intermediate lead finger mounting substrate.

Aoki (figure 7) teaches an intermediate lead finger mounting substrate (11), wherein the intermediate lead finger is mounted on the intermediate lead finger mounting substrate.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the intermediate lead finger mounting substrate of Aoki in the invention

of Gow because an intermediate lead finger mounting substrate of this kind has a lot more strength and provides more support for the lead finger than Gow.

With respect to claims 3 and 22, Aoki teaches the intermediate lead finger and the intermediate lead finger mounting substrate (Aoki calls it an insulation plate) are formed of a non-conducting material (3, 53+).

As to claims 4 and 23, Aoki teaches a die attachment pad (4) attached to the intermediate lead finger mounting substrate.

In re claims 5 and 24, Aoki teaches the die attachment pad is made of a heat-conducting material for rapid heat dissipation (3, 15+).

Regarding claims 6 and 25, Aoki teaches a mold compound that encloses the semiconductor die, a portion of the package lead, the bond wire, the intermediate lead finger, and the die attachment pad (3, 34+).

With respect to claims 7 and 26, Gow teaches the intermediate lead finger comprises a non-conducting portion [adhesive (4, 49+)] for attaching to the intermediate portion of the bond wire.

Claims 2-7 and 21-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Gainey et al., US Patent 6,313,519, as applied to claims 1 and 20 above respectively, and further in view of Aoki et al., US Patent 4,903,114.

As an alternative to the above *35 USC § 102* rejection of these claims, this rejection is cited to reject what was intended to be claimed, specifically the subject matter of figure 1A.

Regarding claims 2 and 21, Gainey fails to teach an intermediate lead finger mounting substrate, wherein the intermediate lead finger is mounted on the intermediate lead finger mounting substrate.

Aoki (figure 7) teaches an intermediate lead finger mounting substrate (11), wherein the intermediate lead finger is mounted on the intermediate lead finger mounting substrate.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the intermediate lead finger mounting substrate of Aoki in the invention of Gainey because an intermediate lead finger mounting substrate of this kind has a lot more strength and provides more support for the lead finger than Gainey.

With respect to claims 3 and 22, Aoki teaches the intermediate lead finger and the intermediate lead finger mounting substrate (Aoki calls it an insulation plate) are formed of a non-conducting material (3, 53+).

As to claims 4 and 23, Aoki teaches a die attachment pad (4) attached to the intermediate lead finger mounting substrate.

In re claims 5 and 24, Aoki teaches the die attachment pad is made of a heat-conducting material for rapid heat dissipation (3, 15+).

Regarding claims 6 and 25, Aoki teaches a mold compound that encloses the semiconductor die, a portion of the package lead, the bond wire, the intermediate lead finger, and the die attachment pad (3, 34+).

With respect to claims 7 and 26, Gainey teaches the intermediate lead finger comprises a non-conducting portion [adhesive (4, 56+)] for attaching to the intermediate portion of the bond wire.

Conclusion

Any inquiry concerning this communication from the examiner should be directed to David A. Zarneke at (571)-272-1937. The examiner can normally be reached on M-F 10 AM-6PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571)-272-1957. The fax phone number for the organization where this application is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David A. Zarneke
Primary Examiner
August 9, 2004